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ABSTRACT

Cadillac Desert is a four-part Public Broadcasting Service (PBS) video series on the remaking of America's West through startling feats of engineering and the consequences that this manipulation of water and nature has wrought. This guide is meant to serve as a resource for discussing the issues raised in the series. The first part of the guide presents a thematic overview of each of the four shows. The first three programs are based on Marc Reisner's groundbreaking book "Cadillac Desert," an examination of how water created the modern American West--the most successful "hydrologic society" in history. The series begins with the story of Los Angeles and its unquenchable thirst for water in "Mulholland's Dream." The second program, "An American Nil," tell how the Colorado River became the most regulated river in history. Next in the series is "The Mercy of Nature" which tracks the political and environmental battles that ended in California's Great Central Valley being transformed from a semiarid desert into the richest agricultural region in the world. The fourth and final program is based on the award-winning book, "Last Oasis" by Sandra Postel. It examines the ramifications of the export of America's water development expertise to the rest of the world, and shows how conservation, recycling, and efficiency offer hopeful and sustainable solutions to the world's gathering water crisis. A synopsis of each major theme, discussion questions, and a list of the key interviewees is included with each show description. Also included in the guide are a resource list, a guide to public discussions, activities for the classroom, and a guide to water resources. (JRH)

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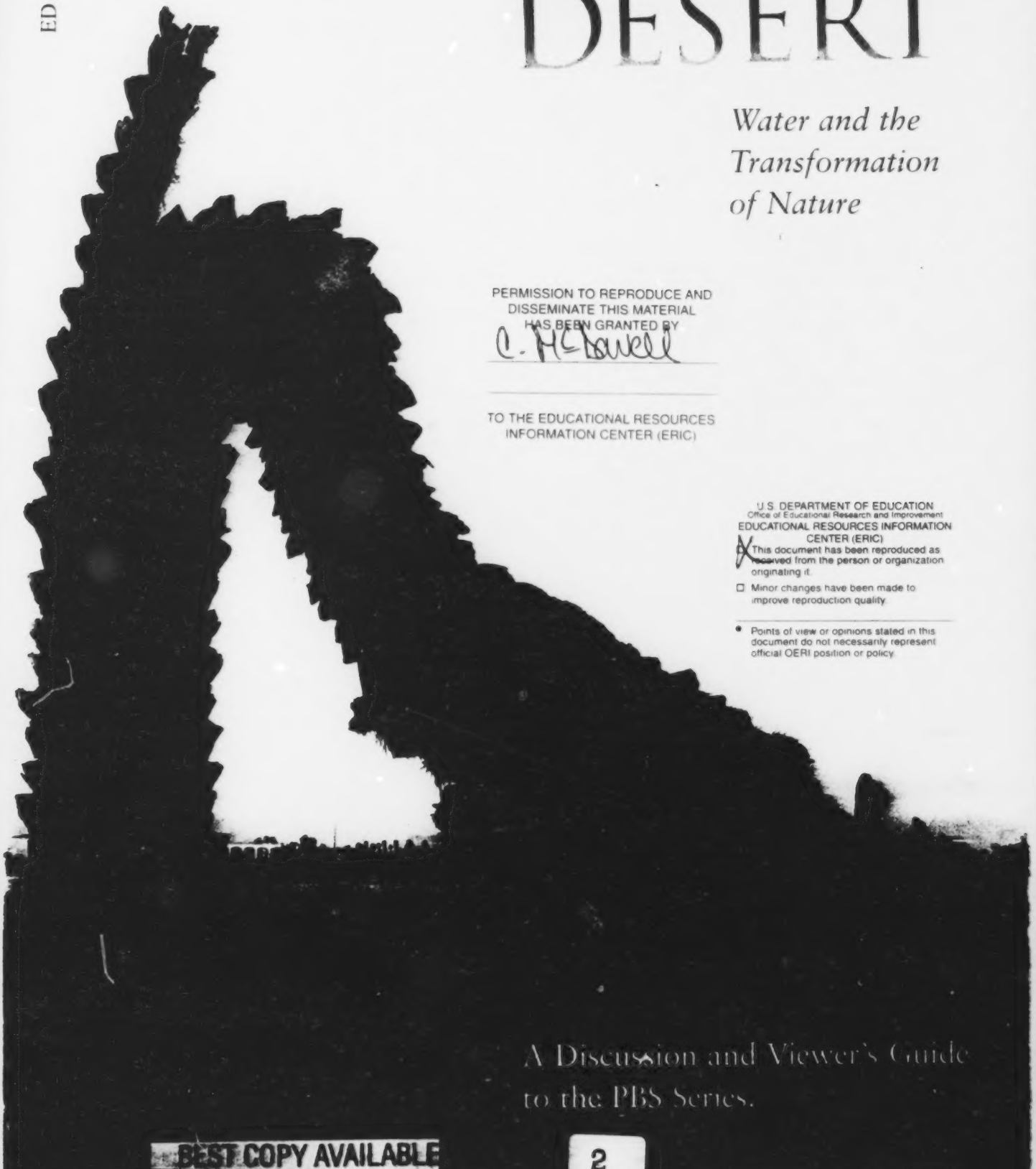
CADILLAC DESERT

Water and the Transformation of Nature



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A Discussion and Viewer's Guide to the PBS Series.

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Dear Viewer,

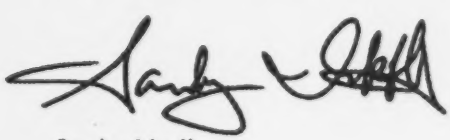
Few things that humans have done to alter the face of nature have had as profound and lasting an impact as the construction of great dams and aqueducts. History is littered with the ruins of civilizations—Babylon, Ur, Mesopotamia—that finally overreached themselves in the liberties they took with water, with their heroic efforts to transform the landscape around them.

In all of history, no desert or semi-desert landscape has been more ambitiously altered than the American West. Cities with millions of people—Los Angeles, Phoenix, even San Francisco—have grown up where the local water supply might have sustained tens of thousands. Immense tracts of desert have been irrigated and turned into productive farmland. It was all possible through the manipulation of water: through the erection of dams as high as skyscrapers and aqueducts that reroute rivers hundreds of miles away.

But the ruins of antiquity pose subversive questions: can America's desert empire withstand the natural forces that brought down almost every hydrologic civilization in the past? Will other countries now attempting to copy our success make fatal mistakes? And what of the environmental costs: the dried-up rivers and vanished wetlands, the great salmon runs obliterated by dams, the inexorable growth of huge cities like Los Angeles and Mexico in smog-choked basins?

Cadillac Desert is the story of the remaking of America's West through startling feats of engineering—and the consequences, some of them fateful, that this manipulation of water and nature has wrought. It is the story of what historians may someday call the Age of Dams. Too little of this history, and its consequences both good and bad, has been learned. This series is a starting point.

Thank you for watching.



Sandra Itkoff
Executive Producer
Cadillac Desert

HOW TO ORDER

Copies of the *Cadillac Desert* series or individual episodes are available for home or educational use. To order call PMI/Home Vision Select 800-343-4727.

Additional copies of the *Discussion and Viewer's Guide* are available from:

CRPI
486 Shawmut Avenue
Boston, MA 02118-3373
617-867-4095
email:cadillac_desert@crpi.org.

Cadillac Desert by Marc Reisner is published by Penguin Books and is available in local bookstores.

Last Oasis by Sandra Postel is published by W. W. Norton and is available in local bookstores. It can also be purchased from the Worldwatch Institute, 1776 Massachusetts Avenue NW, Washington, DC 20036; 202-452-1999.

"As the country amassed a greater and greater federal deficit, people began to say, "Wait a minute! Why are we building billion dollar dams when all you have to do is conserve some water and you can get just as much with conservation as you would with supply?"

Marc Reisner, *Cadillac Desert* author

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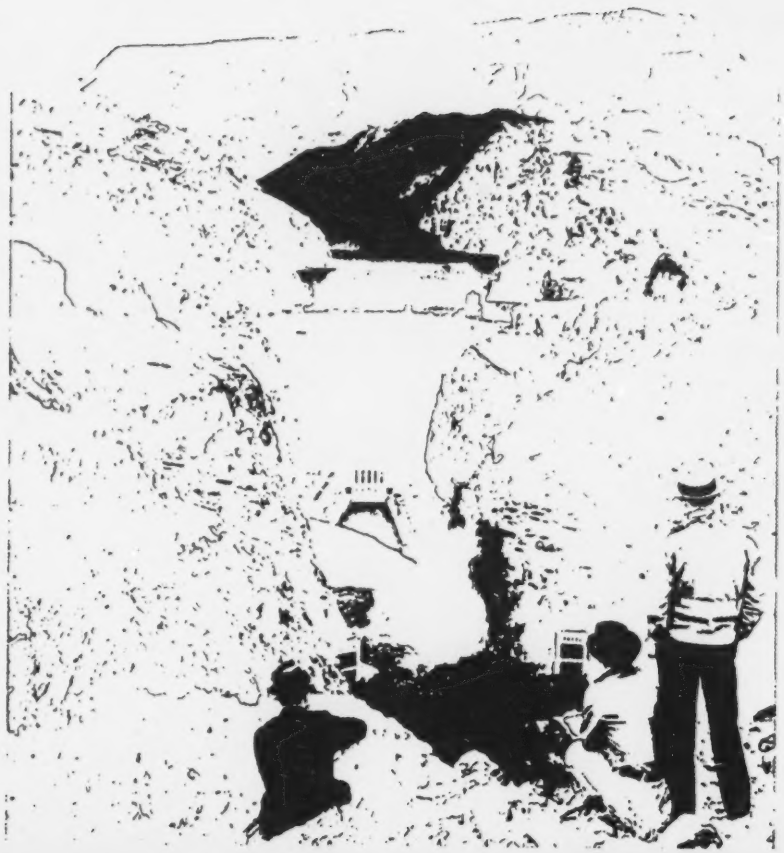


Overview

"In the end, we may need a new water ethic, in a sense, an ethic that says, it's important now to begin sharing water with each other as well as with nature.

Sandra Postel,
Last Oasis author

Water is not only the wealth of a dry land; it is also the essence of life. Without it we cannot survive. It is no wonder then that the history of humankind is replete with our efforts to own, control and manage water. Nowhere is this history more vivid than in the United States, where the arid conditions of the West and the impetus of Manifest Destiny led us to "improve" on nature with thousands of dams and 50,000 miles of aqueducts to control and direct the natural flow of water. In so doing, we have made the landscape wet where it was dry and dry where it was once wet.

This epic transformation of nature—the most ambitious in world history—has created some of the most productive agricultural land in the world. It has allowed us to create cities like Los Angeles and Las Vegas in the most arid of landscapes, and to harness the energy of major rivers to power our industrial growth. But these attempts to control nature, which have been reiterated throughout the world, can come with heavy costs: salinization of the soil, reservoir-borne diseases, ecological disruption, and the ultimate reckoning—the inevitable filling up of reservoirs with silt, rendering them useless and potentially dangerous.

Today, with a greater understanding of ecosystems and an expanded emphasis on water conservation, we are just beginning to attempt to balance the tensions between growth, development, sustainability, and conservation.

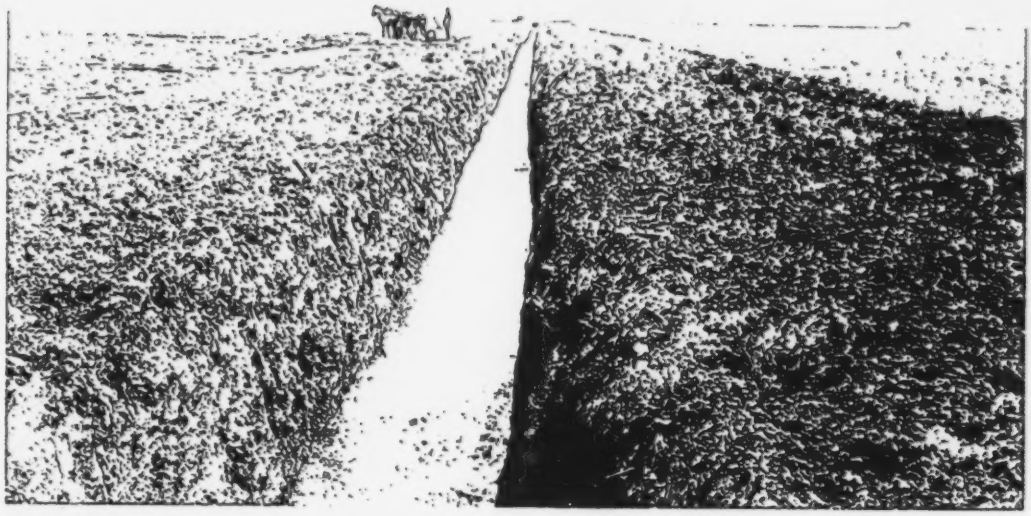
Our capacity to create and maintain this new balance will in part depend on how well we learn from the past. We need to understand the choices we have made, the values that have informed those choices, and the impact of those choices on the basic principles of fairness and equality. It is only in knowing our history that we can improve on the past and realize a better future.

Cadillac Desert—Water and the Transformation of Nature provides compelling insight into the history of the politics of water. Through four rich and splendidly filmed programs, the series examines the economic, environmental, political, and social struggles surrounding one of the world's most precious resource, water. It illustrates how perspective and understanding can change over time, and how the past's good intentions may collide with the reality of the present and the needs of the future.

The first three programs are based on Marc Reisner's groundbreaking book *Cadillac Desert*, an examination of how water created the modern American West—the most successful "hydrologic society" in history. The series begins with the story of Los Angeles and its unquenchable thirst for water, the real-life saga behind the Oscar-winning motion picture *Chinatown*. It moves on to *An American Nile*, which tells how the Colorado River became the most regulated river in history, one illustration of our penchant for controlling and taming nature. *The Mercy Of Nature* tracks the political and environmental battles that ended in California's Great Central Valley being transformed from a semiarid desert into the richest agricultural region in the world.

"Water is the true wealth in a dry land; without it, land is worthless or nearly so. And if you control water, you control the land that depends on it.

Wallace Stegner
author of *Beyond the 100th Meridian*



The final program is based on the award-winning book *Last Oasis* by Sandra Postel. It examines the ramifications of the export of America's water development expertise to the rest of the world, and shows how conservation, recycling, and efficiency offer hopeful and sustainable solutions to the world's gathering water crisis.

This series occurs during a time when concern about the consequences of a century of heroic water development, and the corresponding issues of water use and quality, is increasing. We believe you will find the series and this guide a helpful and important contribution to the ongoing water debate.

About this guide

This guide is meant to serve as a resource for discussing the issues raised in the series. The first part of the guide presents a thematic overview of each of the four shows. With each show description we have included a synopsis of the major theme, discussion questions, and a list of the key interviewees. Also included in the guide are a resource list, a guide to public discussion, classroom activities, and a bibliography. The resource list offers a starting point for locating other water related information. The public discussion section offers valuable guidelines for organizing public dialogues, and the bibliography is a brief listing of books and websites of interest on water related issues.

Mulholland's Dream

In 1903, a rapidly growing Los Angeles was at the limits of its water supply, the meager and erratically flowing Los Angeles River. Faced with exploding population growth and unwilling to live within its means, the "City of Angels" would turn elsewhere to quench its burgeoning need for water.

Mulholland's Dream begins with the extraordinary efforts of Irish immigrant William Mulholland to provide more water for a growing and thirsty Los Angeles. Under his guidance, Los Angeles would first find the water it needed hundreds of miles to the north, in the agriculturally rich Owens Valley. Masquerading as farmers and surveyors, Mulholland's agents convinced and coerced Owens Valley farmers to unwittingly sell their water rights to Los Angeles.

Acquiring the rights to much of the Owens River's flow was an immense challenge for Mulholland, but an even greater one was moving the Owens River to Los Angeles. He would do it by building a 230-mile aqueduct, then the longest in the world by far, across the Mojave Desert into Los Angeles. The ten year project would employ over 100,000 people and create an engineering marvel that is still ranked among the most impressive in history.

While Mulholland was striving to bring water to Los Angeles, a small but powerful group of local capitalists was buying land adjacent to the aqueduct as it passed through the San Fernando Valley northeast of the city. The arrival of the water would make these few rich men vastly richer, spark violence as Owens Valley ranchers took on the city with dynamite and firearms, and open the doors for Los Angeles' unbounded growth—and need for more water. The region's aqueduct system would eventually extend over 600 miles to the Feather River in Northern California, and also to Mono Lake, where in 1980 a band of environmentalists made a successful stand against Los Angeles' long march to water.

William Mulholland's triumphant story would end in disgrace when, in 1928, a dam that he built in San Francisquito Canyon burst, sending a year's worth of Owens Valley water raging down the canyon and killing 450 people. In terms of loss of life, it was the second-worst disaster in California history, and it would mark the end of Mulholland's career. But for Los Angeles, the search for water never stops.

"The thing that you have to remember about Los Angeles is that it never really had a reason to be there... everything that any major American city used to develop itself, LA lacked, and above all it lacked water."

Marc Reisner,
Cadillac Desert author

"Water was power. It was money. Those who knew how to manipulate it much more adroitly than anyone could ever manipulate a stock market could make money off it...a river of greed."

Robert Towne,
Chinatown screenwriter

"It was a little bit like the Sorcerer's Apprentice. You start the process going and you gotta have more water, more water, more water. And you, the father of the city's water system, are supposed to continue to provide this water. It's a terrible place to be."

Catherine Mulholland, granddaughter of Los Angeles water system superindendent William Mulholland

DISCUSSION CORNER

Focus Issue: Growth and Sustainability

Mulholland's Dream demonstrates how our desire to live in certain areas may conflict with the sustainable amount of natural resources in that area. When faced with the problem, we have devised many ways to transport water to where we want to live. But at what cost?

Discussion Points

- What are the consequences of, and solutions to, regional population growth and the increasing competition for water resources? Should we limit development in certain areas?
- Should water-rich communities share their resources with water-poor communities? How would you feel as a member of a water-rich community? What would it be like for you if you were part of the other community?
- Is it ethical to move water from one location to provide for the needs of a different location? Who should determine when we should take such an action: local communities, state agencies, or the federal government?

Key Witnesses

Catherine Mulholland, William Mulholland's granddaughter
Robert Towne, screenwriter, *Chinatown*
Marc Reisner, author, *Cadillac Desert*
Congressman George Miller, D-California
Kevin Starr, California author and historian
Sally Gaines, co-founder, Mono Lake Committee

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An American Nile

For centuries the rugged, wild Colorado River meandered freely through the southwestern landscape, creating wonders such as the Grand Canyon and challenging the ability of great explorers. But the needs of a growing America would pit the might of the raging Colorado against the ingenuity and technology of a handful of true believers who set out to harness the energy of the wildest river in America. Their success would be seen by some as a triumph of engineering and will, by others as an environmental tragedy.

An American Nile chronicles the extraordinary history of the Colorado River as it was transformed into the most regulated and over-allocated river in the world.

In 1922, the growing energy and water needs of the western states forced Herbert Hoover to convene a meeting of those states to divide the Colorado River's water. Nine years later, with the river finally apportioned among warring states, the Black Canyon on the Colorado would be the site for the most ambitious water control scheme in the world: the erection of the Hoover Dam. Four other projects of similar scale were underway on other western rivers before the Hoover Dam was even finished. At that time, they were the largest structures ever built on earth.

During this period known as the "Go Go Years" of dam building, close to a thousand great dams would be built in the United States. Between the United States and Canada, 55 of them were built just on the Columbia River and its tributaries. Unfortunately, the environmental costs would not be evident until much later. By 1956, salmon runs on the Columbia River—the most productive salmon river anywhere—would be diminished by ninety percent. Extravagantly scenic Glen Canyon was slowly drowned as the Glen Canyon Dam pooled water into a giant reservoir. But it was only a plan by the Bureau of Reclamation to build two Grand Canyon dams that would enrage the public enough to end this period of mass water development.

The once raging Colorado River is now virtually stopped by a chain of reservoirs; only in very wet years does the river manage to reach the sea. Instead, in most years, it is completely diverted for human consumption by the time it reaches the desert sands of northern Mexico.

"When you dam a river, you always lose something."
Barry Goldwater,
former U.S. Senator

"The impact that large, mainstream storage reservoirs had on salmon and other fishery resources was something that was recognized and then dismissed. That was the cost. That was the price that one paid for development."
Daniel Beard,
Commissioner, Bureau of Reclamation, 1993-95

"The Colorado River is the lifeblood of the Southwest. Without the Colorado, without a stable water supply, the Southwest would not look anything like it does."

Blaine Hamman, Hoover Dam Manager

DISCUSSION CORNER

Focus Issue: Managing Nature

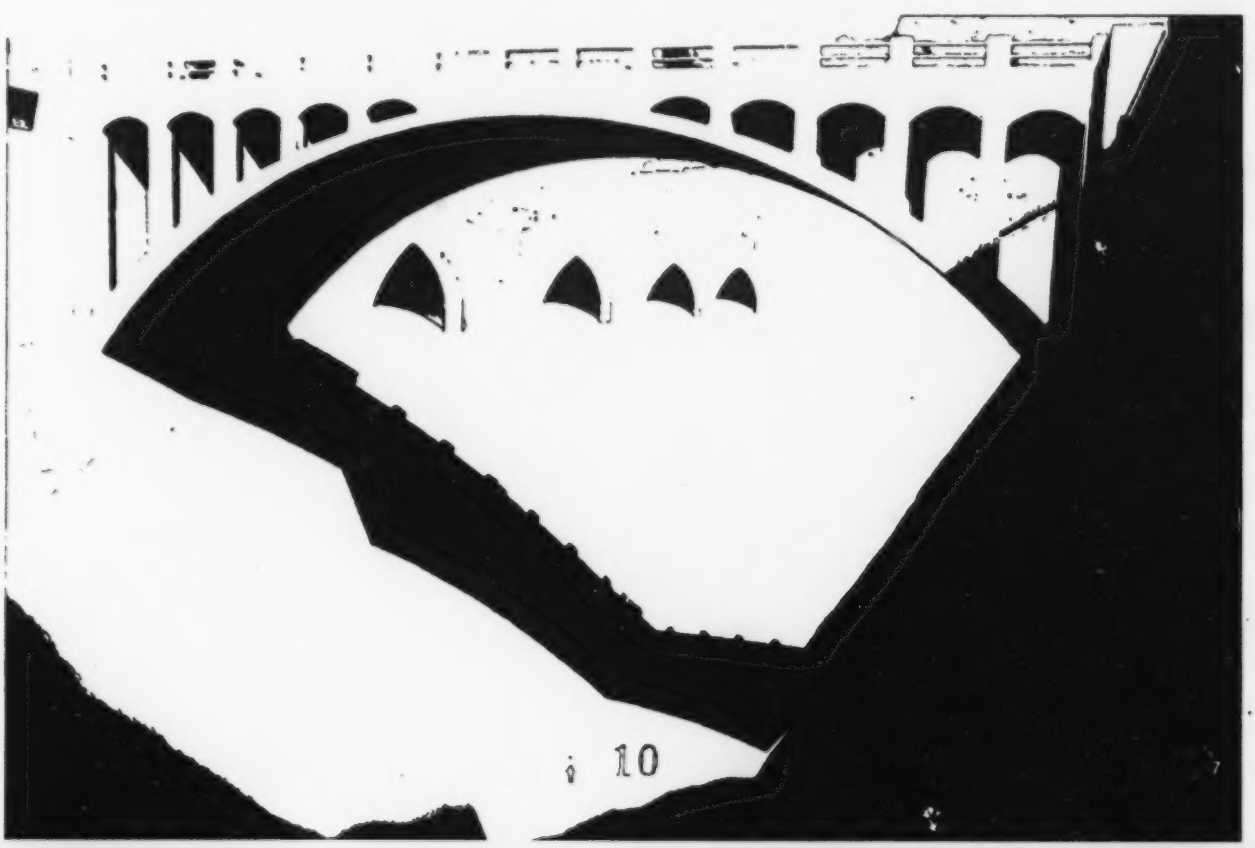
An American Nile provides a firsthand look at our ability to manage and manipulate water, and the resulting political, social and environmental costs. The story reminds us that solutions that seem expedient today may set the stage for environmental problems in the future.

Discussion Points

- The control of the Colorado River has benefited millions of people. It has also resulted in a profound alteration of nature. Was it worth the cost?
- One of the benefits of damming rivers is the creation hydroelectric power. What are the costs and benefits of hydroelectric power?
- How can we satisfy our increasing demands for water while addressing environmental concerns?

Key Witnesses

Patricia Mulroy, General Manager, the Las Vegas Valley Water District
Barry Goldwater, former U.S. Senator, Arizona
Floyd Dominy, Commissioner, Bureau of Reclamation, 1959-69
Daniel Beard, Commissioner, Bureau of Reclamation, 1993-95
Blaine Hamann, Manager, Hoover Dam
Marc Reisner, author, *Cadillac Desert*
Ferrell Secakuku, Chairman, Hopi Tribe



The Mercy of Nature

By 1929, having transformed the Central Valley from near-desert into an artificial Florida, California had become the country's leading agricultural state. But to achieve this status, growers had installed 24,000 pumps drawing water from underlying aquifers. The promised land was running out of groundwater—the most accessible source. Farmers could either limit their pumping and produce less, or they could search for new water. They chose the latter.

In the 1930s, cheap water from Central Valley aquifers and the cheap labor of the Dust Bowl refugees were fueling phenomenal agricultural growth in California. But as the water began to run out, farmers would turn to the Bureau of Reclamation to help bring melted snow from the Sierra Nevada to the farms of the Central Valley. Much of the land irrigated by the federally subsidized Central Valley Project, however, would not be cultivated by small farmers as Reclamation law required, but by corporations such as Southern Pacific and the Boswell Company's cotton empire.

"The theory was if any water reached the ocean, it was wasted."

George Miller,
U.S. Congressman

With the Central Valley Project supply totally committed by the late 1960s, farmers wanted even more water and no limits on the size of acreage. Greater Los Angeles was again running out of water, as well. Sensing an immense political opportunity, California Governor Pat Brown initiated the State Water Project, the scale of which would nearly equal that of the federally subsidized Central Valley Project. By 1974, the Central Valley was producing twenty-five percent of America's food—but much of the profit was still being captured by giant agri-business companies that bought taxpayer-subsidized irrigation water at extraordinarily cheap rates. Jimmy Carter was the first president to mount a serious effort to stop this scandal, but, says *Cadillac Desert* author Marc Reisner, "He failed to see how water flows uphill toward power and money." Caught in a fight for his political life after the failed rescue mission for hostages in Iran, Carter retreated from water reform in the Central Valley.

"Water makes wealth. Water can turn a low value piece of property into something you can grow lettuce on."

Jason Peltier, Manager,
Central Valley Project Water Association

In 1992, an urban-dominated Congress finally imposed limits on the enormous thirst of California agriculture, which, in effect, was creating an artificial drought affecting the natural environment and cities alike. As decimated salmon populations are slowly restored to Central Valley streams, and as farm water formerly lavished on low-value crops makes its way to Silicon Valley, California's largest growers must wrestle with new restrictions on their previously unchallenged water rights and usage.

"Water projects are symbols... they're always something much larger than what they really are."

Daniel Beard, Commissioner, Bureau of Reclamation, 1993-95

DISCUSSION CORNER

Focus Issue: Balancing Rights

In *The Mercy of Nature* we are confronted with the issue of fairness in water policy and practice. While California has begun to address the historical imbalance of its water policy, we will always have to struggle over the issues of who should get water, at what cost, and for what purposes. This struggle is often a question of balancing competing rights and needs.

Discussion Points

- Who should bear the cost of developing water? Are agricultural subsidies justified for the sake of food production, and as a means of containing urban sprawl by having more farm land in production?
- Do we currently have the right balance between protection of the environment, supplying urban water needs, and agricultural water use?
- In your local water district, how is water demand managed and regulated? Who benefits from the current regulatory practice? What changes, if any, would you make to those practices?

Key Witnesses

Floyd Dominy, Commissioner, Bureau of Reclamation, 1959-69
Daniel Beard, Commissioner, Bureau of Reclamation, 1993-95
Congressman George Miller, D-California
Kathleen Brown, California State Treasurer, 1991-94
Jason Peltier, Manager, Central Valley Project Water Association
Marc Reisner, author, *Cadillac Desert*

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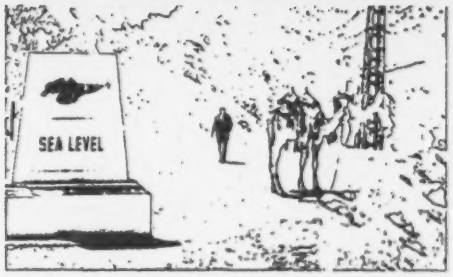
Last Oasis



Even as the technological "know-how" that created over a thousand dams in the United States is being exported throughout the world, humankind is awakening to the fact that water is a limited resource that can only be preserved through sound management and conservation.

As the era of big dam building comes to a close in the United States, India and China have embarked on some of the most ambitious water project agendas the world has ever seen. In the final episode of the series we travel to these countries to witness how India has staked its future on large dams and China mimics America's "Go Go" years of dam building. The Sardar Sarovar project on India's Narmada River could displace one hundred thousand people. China's Three Gorges Dam will be the largest ever built in the world; it will dam a scenic canyon as famous in China as the Grand Canyon is in the United States.

In Mexico City, the underlying aquifer is so overdrawn that the city sinks twelve inches a year. Nearly one quarter of the city's water is pumped in from one hundred miles away through decaying pipes. Where rivers are shared by several countries, water scarcity can lead to increased competition for water, sometimes fueling conflict and violence. The continual disputes between Israel, Jordan, Syria and Palestine over limited water supplies are cases in point.

South of the U.S. border in Mexico's Colorado Delta, is an ecosystem all but destroyed as a result of the dams and diversions along the Colorado River in the United States. The Cucapa fishermen used to make their living fishing the Delta waters. But they are impoverished now because the Delta has turned into a wasteland of cracked mud and dried-out salt flats. The Delta is a cautionary tale of how the fate of human communities is tied to the health of the ecosystems on which they depend.

"We've got to move toward pricing water at somewhere near its value...It's ludicrous that the most fundamental resource that we have, the one that is fundamental to life, is a resource...we're giving away."

Daniel Beard,
Commissioner, Bureau of Reclamation, 1993-95

In *Last Oasis*, there are accounts from all over the world of new efforts to make conservation and ecosystem protection an integral part of water policy. And these efforts are beginning to pay off. Israel, which now recycles two-thirds of its municipal water, pioneered drip irrigation and waste water recycling to make the once barren Negev Desert bloom. A community group called The Mothers of East Los Angeles is successfully encouraging local residents to replace their old water-guzzling toilets with water-efficient models, saving the city eight million gallons of water per day. The defeat of a giant dam proposal by the City of Denver is forcing the city to look to conservation to meet its water needs. In California's Imperial Valley, farmers now sell some of their water supply to thirsty cities in an arrangement that would have been impossible not long ago.

There will never be more water on earth that there is today, and the "last oasis" of conservation and efficiency is our best hope for living in balance with earth's most precious resource.

"Over a billion people in the world don't have access even to basic drinking water and sanitation requirements.

Sandra Postel, *Last Oasis* author

DISCUSSION CORNER

Focus Issue: Demand and Conservation

Every region on earth struggles, in its own way, with water problems. To meet the ever increasing demand for water, the world is learning new ways to manage the fragile relationship between conservation, water quality, ecosystem health and water demand by exploring the adoption of a new "water ethic."

Discussion Points

- Consider what it would mean to the people of different communities in your area if water were priced at its true cost.
- Should we be concerned with how people from other countries use and manage water? How does their use of water affect us here in the United States? And how does our use affect them? Should/can "Third World" countries develop their water resources in the same way the United States did in the past?
- Who benefits when local communities conserve water? What are the real economic and social advantages of conservation? How should the savings from conservation be shared with the public?
- How can we ensure that ecosystems get the water they need to remain healthy?

Key Witnesses

Sandra Postel, author, *Last Oasis*, Director of the Global Water Policy Project
Daniel Beard, Commissioner, Bureau of Reclamation, 1993-95
Professor Hillel Shuval, Hebrew University, Israel
Alejandro Robles, Executive Director, Conservation International, Mexico
Professor Charles Wilkinson, University of Colorado School of Law
Elsa Lopez, Director, Mothers of East Los Angeles
Ken Strom, National Audubon Society
Marc Reisner, author, *Cadillac Desert*

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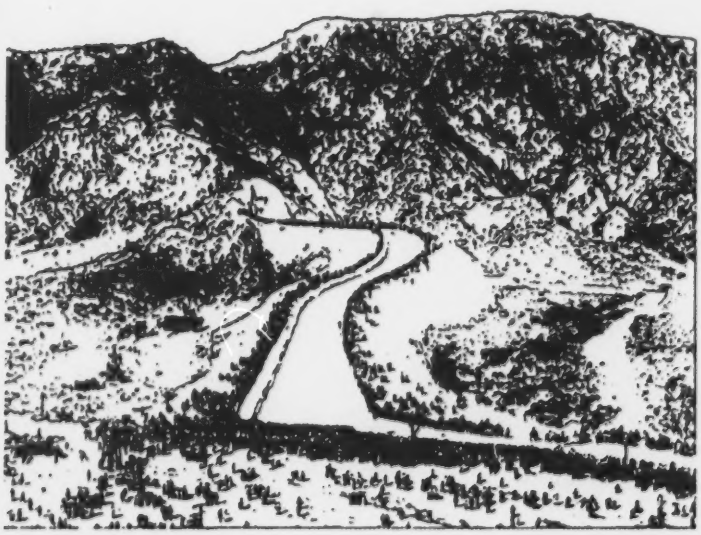
Guide to Public Discussions

Building successful public forums is essential to creating public action. Successful dialogues seek to create areas of common ground and encourage local citizen action around water conservation, specifically, and resource conservation, generally. Effective dialogue comes out of candor, careful listening, and respectful attention to another person's opinion.

BUILDING SUCCESSFUL CONVERSATIONS

There are a variety of methods to support and enhance public conversation about environmental and conservation issues. The first step is to identify the issues in your area. The best and most effective public dialogue comes from issues that people genuinely care about and that have a direct impact on their lives. Here are a few suggestions:

- **Diversify the Audience** Avoid "preaching to the choir." Whether it's a formal debate or a more informal gathering, invite people of different and/or conflicting points of view.
- **Build on Existing Assets** It's always more effective to build on community assets. Use organizations and institutions that already exist. Many environmental and conservation groups have speakers' bureaus. So do many developers, and city, county and state governments. Colleges and universities may offer their resources, too. This might include everything from a room in which to hold a discussion to faculty expertise.
- **Set Achievable Goals** It helps to set small and realistic goals. It's impossible to change the world overnight. Progress in changing opinion and long-held ways of thinking comes in increments.
- **Use the Media** Involve the media. Newspapers, television and radio stations may all be interested in your public forum. Make sure the media is informed and kept up to date on your plans. Be responsive to inquiries.
- **Get Firsthand Experience** It's always helpful to see real-life examples of the issue or point of conflict. Field trips work. They can illustrate an issue better than anything else, especially in terms of specific actions or consequences.
- **Look for Existing Forums** Many of these local subjects are already being aired in a variety of public forums such as your City Council, County Commission, or Planning Commission. In most cases, these meetings are open to the public. Also, taking a group to see, for example, the state legislature in action shows how things really work and how long it can take to make something happen.
- **Ask the Right Questions** The questions you use to open a conversation will in part determine how well the conversation goes. Keep your questions open-ended so they allow for divergent views. The question should always make it possible for the person with the least popular opinion to feel that his/her opinion is valuable.
- **Look for Values** Most conversations get bogged down in trying to determine which position is right. Try to keep the conversation focused on the values that underlie the various positions, and the resulting trade-off among competing values that the public has to make.



Activities for the Classroom

The following activities are provided as examples of the many ways that water education can be brought into the classroom and other learning centers. For more information on educational activities, contact one of the many organizations listed in the resources section or visit our website at www.crpi.org/cadillacdesert.

RESEARCH ACTIVITIES

- Have the class research and locate the source of water for your city or county. Is it rivers, lakes or aquifers? Is the water brought in from somewhere else? Has that source changed over the years? What is the status of the water supply?
- Have the class research how much water your city or county uses per year, and how much is used per person or per family, per day or per year. Is that average going up or down? If the population is rising in your area, what does that mean for future water supplies?
- Have each student research his or her family's water use pattern for one week and finds ways to lower their water use. For example, determine how much water is used each time the toilet is flushed, how many times it is flushed per week, and strategies for reducing the amount of water per flush or the amount of flushes per week. Do the same for other household water uses, such as, washing clothes, watering the lawn, or using the dishwasher.
- Organize a class discussion about the advantages and disadvantages of a large water project such as dams and aqueducts. What are the benefits of leaving a river in its natural state, as opposed to diverting the water for agriculture and urban development? Is compromise possible? If so, how?
- If there's a dam, water purification plant or wastewater treatment plant in your area, arrange to have your class prepare a social history on its development.
- Visit a farm and research its water requirements and irrigation system. Ask your local water department what percentage of water in your area is used for agriculture. Have the class try to develop a plan to help a local farm reduce its water requirements while maintaining its current production capacity.
- Identify your political representatives from the city level through the federal government. What are the pressing water issues in your area and how have these representatives voted over the year? Have their positions changed? If so, how?
- Investigate the status of the water conservation movement in your area. What are the most active and influential environmental groups? Invite representatives from these organizations talk to the class, or visit their headquarters. Have the class chart the effectiveness of one of the organization's education projects. How effective is the project at reaching the general public? Have the class create an education project that reaches audiences not currently served by the local conservation movement.

KEY WORDS

Acre foot of water The amount of water it takes to cover an acre of land to a depth of one foot; about 326,000 gallons. An acre-foot covers an area about the size of a football field.

Aqueduct An artificial conduit used to transport water, usually a pipeline or canal.

Aquifer A layer of rock, sand and gravel beneath the surface of the soil that contains water in large amounts.

Desalination Removing salt from water, especially ocean water.

Ground water water held in underground basins.

Hydroelectric power Electricity produced when water is forced to turn turbine/generators in a magnetic field.

Process water Water that comes into contact with an end-product or material and becomes itself part of the end-product, like tomato juice or hair shampoo.

Sludge Solid dirt and grit produced by settling or sedimentation of wastewater.

Wastewater Used water that cannot be returned to the water cycle without being treated; sewage.

Water table The level of water underground.

Watershed Land area that drains rain or snow into a stream, river system, or other large body of water.

Wetlands Lands under water much of the time, like tide pools or swamps.

Source: *The Official Captain Hydro Water Conservation Workbook and Teacher's Guide.* Oakland, CA: East Bay Municipal Utility District, 1992.

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Guide to Water Resources

Many state university cooperative extension services and state conservation departments provide water education materials and resources specific to that state. Some of these materials are designed to educate young people; other materials are resources for a general adult audience, or professionals and interest groups serving the general public. County and state offices of education often provide environmental education resources for teachers and other organizations. In addition, many local water districts supply water conservation materials. Please check your local offices.

"There's no better example of a project we shouldn't be involved in than (China's) Three Gorges Dam. We've moved away from water project construction in the United States, and I felt it was hypocritical for us to continue to be involved in the largest dam construction project in the world."

Daniel Beard,
Commissioner, Bureau of Reclamation, 1993 to 1995

American Water Works Association (AWWA)
6666 W. Quincy Avenue
Denver, CO 80235
800-926-7337
http://www.awwa.org

The AWWA is an international nonprofit scientific and educational society dedicated to the improvement of drinking water quality and supply.

California Institute of Public Affairs (CIPA)
PO Box 189040
Sacramento, CA 95818
916-442-2472

CIPA seeks to promote sustainable development and the protection of natural resources in California. They publish numerous descriptive directories including: *California Water Resources Directory, California Environmental Directory*, and *The California Handbook*.

Educational Resources Information Center (ERIC) **Clearinghouse for Science, Mathematics and Environmental Education** (ERIC/CSMEE)
1929 Kenny Road
Columbus, OH 43210-1080
800-let-eric
email erics@osu.edu

ERIC is a nationwide information system sponsored by the U.S. Department of Education. The database contains journal articles, reports, curricula, conference reports, and other documents.

Environmental Defense Fund, Inc. (EDF)
257 Park Avenue South
New York, NY 10010
212-505-2100
email members@edf.org
http://www.edf.org

EDF is a leading nonprofit, environmental organization active in a wide range of issues, including protection of the global atmosphere, control of solid and toxic wastes, and the safeguarding of wildlife, habitats, and water.

Global Rivers Environmental Education Network (GREEN)
206 South Fifth Avenue, Suite 150
Ann Arbor, MI 48104
313-761-8142
email green@green.org
http://www.econet.apc.org/green

GREEN takes an innovative and action-oriented approach to education based on an original, interdisciplinary watershed education model.

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National Audubon Society
700 Broadway
New York, NY 10003-9501
212-979-3000
email webmaster@list.audubon.org
http://www.audubon.org

Solid science, policy research, forceful lobbying, litigation, citizen action, and education--these are the tools used by the Audubon Society to protect the air, water, land, and habitat that are critical to our health and the health of the planet.

National Energy Foundation
5225 Wiley Post Way, Suite 170
Salt Lake City, UT 84116
801-539-1406
email info@nef.org

The nation's premiere nonprofit provider of educational programs and materials dealing with energy, natural resources, and the environment.

National Environmental Directory Project
PO Box 8175
Missoula, MT 59807
406-721-0440
email ned@ism.net

This project publishes directories (paper and disk versions) of environmental resources for the Rocky Mountain Region, New England, California, Southeast, Pacific Northwest, Central Regions, and the Great Lakes Region.

National Wildlife Federation (NWF)
310 Tyson Drive
Winchester, VA 22603
800-477-5560
email brown@nwf.org

NWF's primary goal is to educate citizens about the need for sustainable use and proper management of our natural resources. NWF publishes the *Conservation Directory* which is updated annually. The directory lists governmental and non-governmental organizations and personnel engaged in conservation work at state, national and international levels.

Natural Resources Defense Council
40 West 20th Street
New York, NY 10011
212-727-2700
email nrdcinfo@nrdc.org
http://www.nrdc.org

NRDC is a national nonprofit organization dedicated to protecting the world's natural resources and ensuring a safe and healthy environment for all people. With 250,000 members and a staff of lawyers, scientists, and other environmental specialists, NRDC combines the power of law, the power of science, and the power of people in defense of the environment.

North American Association for Environmental Education
PO Box 400
Troy, OH 45373
513-676-2514
email jthoreen@igc.apc.org

The North American Association for Environmental Education is a network of professionals and students working in the field of environmental education through North America and in over forty countries around the world.

Pacific Institute
1204 Preservation Park Way
Oakland, CA 94612
510-251-1600
email pistaff@pacinst.org

The Pacific Institute is committed to finding solutions to the related problems of regional and global environmental degradation, unsustainable development, and political conflict through interdisciplinary research, policy analysis, and public outreach. The Institute's Water and Sustainability program has a focus on California's water policy and western water policy surrounding the Colorado River and Delta. The Community Strategies for Sustainability and Justice program has also focused on water issues as they affect communities of color and low-income communities.

Save Our Streams Program
The Izaak Walton League of America, Inc.
707 Conservation Lane
Gaithersburg, MD 20878-2983
800-bugiwla
email sos@iwla.org
http://www.iwla.org

The *Save Our Streams* program has been teaching people of all ages how to adopt and protect streams and rivers. Activities include making observations, stabilizing stream banks, planting trees, and organizing cleanup campaigns.

The Terrene Institute
4 Herbert Street
Alexandria, VA 22305
703-548-5473
email terrinst@aol.com

Terrene is a clearinghouse and facilitator for watershed information and for non point source pollution. The available materials include posters, pamphlets, technical papers, and manuals.

Water Education Foundation
717 K Street, Suite 517
Sacramento, California 95814
916-444-6240

A nonprofit organization dedicated to the development and implementation of public information and education programs on water resources, conservation, reclamation, reuse, and development.

Water Environment Federation
601 Wythe Street
Alexandria, Virginia 22314-1994
800-666-0206
email msc@wef.org
http://www.wef.org

The Water Environment Federation is a not-for profit technical and educational organization. Its goal is to preserve and enhance the global water environment.

The Watercourse and National Project WET
201 Culbertson Hall
Montana State University
Bozeman, MT 59717
406-994-5392
email rwwet@montana.edu

The goal of The Watercourse is to promote and facilitate public understanding of atmospheric, surface, and groundwater resources and related management issues through publications, instruction, and networking.

Worldwatch Institute
1776 Massachusetts Avenue, NW
Washington, DC 20036-1904
202-452-1999
email worldwatch@igc.apc.org

A nonprofit research organization designed to inform policymakers and the public about emerging global problems and trends and the complex links between the world economy and its environmental support systems.

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WATER RELATED WEB SITES

Clearinghouses

WaterWiser
http://www.waterwiser.org/

WaterWiser's mission is to be the preeminent resource for water efficiency and water conservation information. WaterWiser is a cooperative project of the American Water Works Association, the U.S. Environmental Protection Agency and the U.S. Bureau of Reclamation.

EcoNet
http://www.econet.apc.org/econet/en.orgs.html

Directory of EcoNet members whose materials are available on the Internet, most via the EcoNet Gopher and EcoNet World Wide Web site.

The Environmental Information Center
http://www.igc.apc.org/eic/

The Environmental Information Center in early 1996 is functioning as the resource for several major public education campaigns about environmental issues. Through a network of grassroots organizers around the country, and with attention-getting advertisements, reports, and press events, they are getting the word out about environmental issues.

National Directory of Citizen Volunteer Monitoring Programs
http://www.epa.gov/OWOW/secs/dir.html

This document lists 519 citizen volunteer monitoring programs around the country, arranged by place. Key information, including a contact name, address and type of waters monitored, is also provided.

U.S. Water News Online
http://www.mother.com/uswaternews/

U.S. Water News Online is the electronic version of America's premier water news publication. U.S. Water News Online keeps its readers abreast of the latest news concerning water and water issues around the country.

The WaterWeb
http://waterweb.com/

The WaterWeb is designed to provide water professionals around the world a host of information regarding all facets of the water technology community. Plan on visiting often, using "What's New" to keep track of weekly content additions.

WWW Virtual Library Environment
http://ecosys.drdr.Virginia.EDU:80/hyd.html

A listing of water related web sites across the country.

Academic Institutions

The National Institutes for Water Resources
http://wrri.eng.clemson.edu/

The National Institutes for Water Resources is a network of Research Institutes in every state. They conduct basic and applied research to solve water problems unique to their area. The bulk of Institute funding comes from non-federal sources.

The Powell Consortium
http://wrri.nmsu.edu/powell/

The Powell consortium is an alliance of seven Water Resources Research Institutes and Centers from the states of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming formed to work on water resources problems of the Colorado River/Great Basin region. You can access information on all seven from here.

Universities Water Information Network
http://www.uwin.siu.edu/welcome/index.html

(UWIN) is designed to aid the flows of water information along the information superhighway. UWIN maintains many information services of interest to managers, researchers, consultants, and teachers throughout the water resources community. UWIN is housed at UCOWR Headquarters which is located on the campus of Southern Illinois University at Carbondale.

Environmental Education

The Directory of Environmental Education Resources
http://www.einet.net/hytelnet/FUL008.html

(DEER) is a joint project of the Colorado Alliance for Environmental Education and the Colorado Department of Education. DEER includes Colorado and regional agencies, organizations, companies, groups, and individuals who disseminate environmental education resources. Contact the organizations listed for more information about their programs.

EELink-Environmental Education on the Internet
http://www.eelink@eelink.umich.edu/

Consisitent with the key principles of environmental education, our mission is to spread information and ideas that will help educators explore the environment and investigate current issues with students. We are building this resource for students, teachers and professionals that support K-12 environmental education, such as media specialists, inservice providers, nature center staff and curriculum developers.

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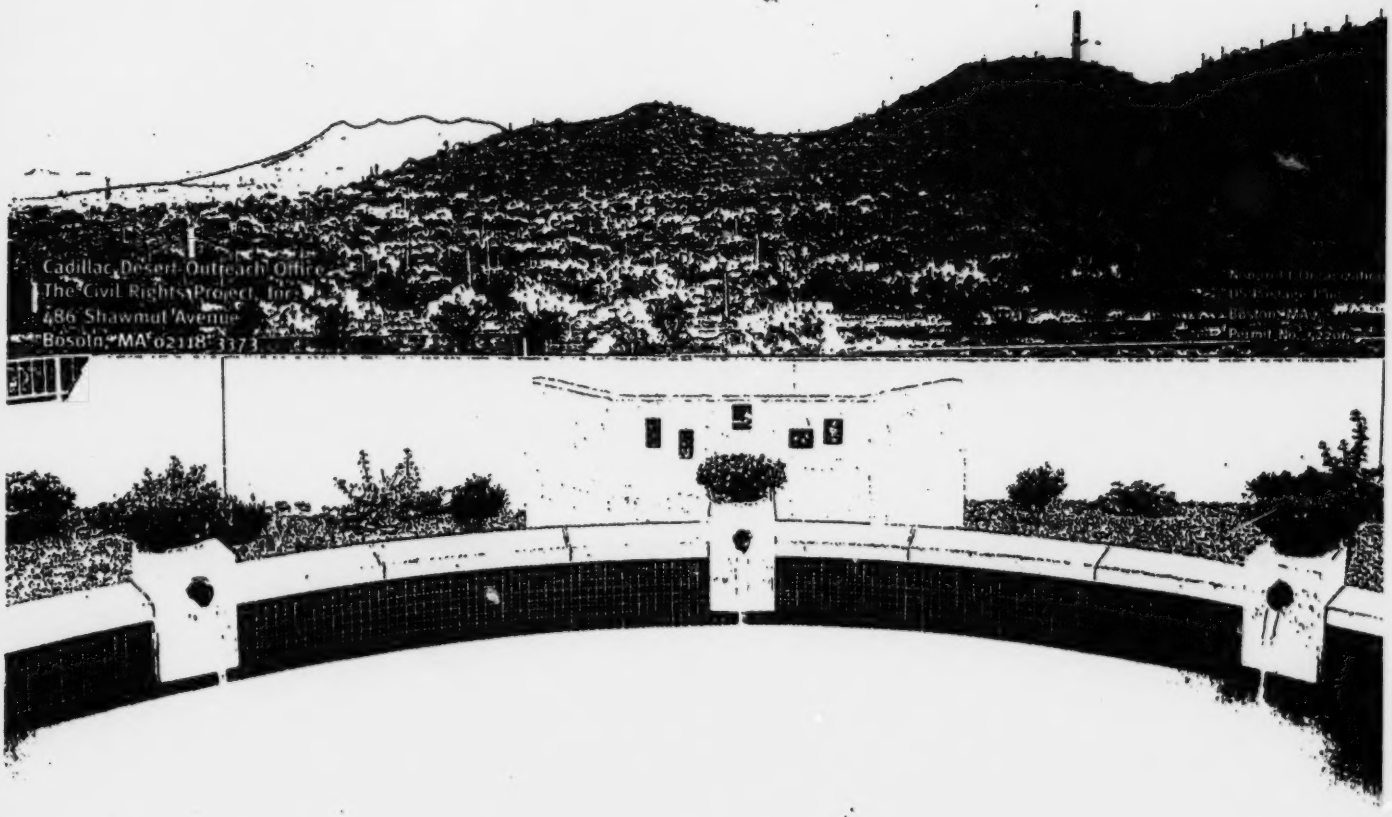

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